CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

# MONITORING AND REPORTING PROGRAM R5-2017-00XX
# FOR
# WASTE DISCHARGE REQUIREMENTS GENERAL ORDER
# OIL FIELD DISCHARGES TO LAND
# GENERAL ORDER NUMBER THREE

This Monitoring and Reporting Program (MRP) is required pursuant to Water Code section 13267. The Discharger shall not implement any changes to this MRP unless and until the Central Valley Water Board adopts, or the Executive Officer issues, a revised MRP. Changes to sample location(s) shall be established with concurrence of Central Valley Water Board staff, and a description of the revised stations shall be submitted for approval by the Executive Officer.

This MRP includes Monitoring, Record-Keeping, and Reporting requirements. Monitoring requirements include monitoring of discharges, of produced wastewater, solid waste, application of recycled materials (wastewater and solids), and groundwater to in order to determine if the Discharger is complying with the requirements of Waste Discharge Requirements General Order No. R5-2017-XXXX (Order). All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. All analyses shall be performed in accordance with ***Standard Provisions and Reporting Requirements for Waste Discharge Requirements***, dated 1 March 1991 (Standard Provisions).

Field test instruments (such as a pH meter) may be used provided that the operator is trained in the proper use of the instrument and each instrument is serviced and/or calibrated at the recommended frequency by the manufacturer or in accordance with manufacturer instructions.

Analytical procedures shall comply with the methods and holding times specified in the following: *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* (EPA); *Test Methods for Evaluating Solid Waste* (EPA); *Methods for Chemical Analysis of Water and Wastes* (EPA); *Methods for Determination of Inorganic Substances in Environmental Samples* (EPA); *Standard Methods for the Examination of Water and Wastewater* (APHA/AWWA/WEF); and *Soil, Plant and Water Reference Methods for the Western Region* (WREP 125). Approved editions shall be those that are approved for use by the United States Environmental Protection Agency or the State Water Board's Environmental Laboratory Accreditation Program. The Discharger may propose alternative methods for approval by the Executive Officer.

The MRP can be modified if the Discharger provides sufficient data to support the proposed changes. If monitoring consistently shows no significant variation in magnitude of a constituent concentration or parameter after a statistically significant number of sampling events, the Discharger may request this MRP be revised by the Executive Officer to reduce monitoring frequency or minimize the list of constituents. The proposal must include adequate technical justification for reduction in monitoring frequency.

Monitoring requirements include the periodic visual inspection of the facility to ensure continued compliance with the Order. The MRP also requires submittal of information regarding the use of all chemicals used during well drilling, installation, operation, and maintenance activities associated with each well generating waste materials (liquids and solids) that are discharged to land and regulated under this Order.

This MRP requires the Discharger to keep and maintain records for five years from the date the monitoring activities occurred and to prepare and submit reports containing the results of monitoring

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specified below. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Central Valley Water Board.

## FACILITY MONITORING

Permanent markers in ponds shall be in place with calibrations indicating the water level at design capacity and available operational freeboard (two feet minimum required). The freeboard shall be monitored **monthly** on all ponds to the nearest tenth of a foot.

Annually, prior to the anticipated rainy season, but **no later than 30 September**, the Discharger shall conduct an inspection of the facility. The inspection shall assess repair and maintenance needed for: drainage control systems; slope failure; groundwater monitoring wells, or any change in site conditions that could impair the integrity of the waste management unit or precipitation and drainage control structures; and shall assess preparedness for winter conditions including, but not limited to, erosion and sedimentation control. The Discharger shall take photos of any problems areas before and after repairs. Any necessary construction, maintenance, or repairs shall be **completed by 31 October**. Annual facility inspection reporting shall be **submitted by 30 November**.

The Discharger shall inspect all precipitation diversion and drainage facilities for damage **within 7 days** following major storm events (e.g., a storm that causes continual runoff for at least one hour) capable of causing flooding, damage, or significant erosion. The Discharger shall take photos of any problem areas before and after repairs. Necessary repairs shall be commenced **within 30 days** of the inspection. Notification and reporting requirements for major storm events shall be conducted as required in Reporting Requirements of this MRP.

The Discharger shall monitor and record on-site rainfall data using an automated rainfall gauge, or subject to Executive Officer approval other acceptable gauge/monitoring arrangement, or a weather monitoring station within three miles of the facility. Data shall be used in establishing the severity of storm events and wet seasons for comparison with design parameters used for waste management unit design and conveyance and drainage design. Daily data and on-site observation shall be used for establishing the need for inspection and repairs after major storm events. Rainfall data shall be reported in the quarterly monitoring reports, as required by this MRP.

## CHEMICAL AND ADDITIVE MONITORING

The Discharger shall provide the following for all chemicals and additives[1] used at all leases and facilities that discharge produced wastewater to land:

| Requirement | Frequency |
|---|---|
| A list of all chemicals and additives used including chemical formulas and specific chemical names. | Quarterly |
| The volume of each chemical and additive used in gallons. | Quarterly |
| A list of the leases and facilities where the chemicals and additives are being used. | Quarterly |
| Material safety data sheets for each chemical and/or additive. | Annually |

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[1] Chemicals that are a part of trade secrets shall be kept confidential at the Central Valley Water Board. Documents containing trade secrets shall be properly marked on the cover, by the Discharger, prior to submitting the document to the Central Valley Water Board. Individuals that have received permission by the Discharger shall be granted access to view the files at the office.

## PRODUCED WASTEWATER MONITORING

Produced wastewater (also referred to as effluent) samples shall be representative of the volume and nature of the discharges. The Discharger shall maintain all sampling and analytical results: date, exact place, and time of sampling; dates analyses were performed; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of five years.

A complete list of substances that are tested for and reported on by the testing laboratory shall be provided to the Central Valley Water Board. All peaks must be reported. In addition, both the method detection limit (MDL) and the practical quantification limit (PQL) shall be reported. Detection limits shall be equal to or more precise than USEPA methodologies. Analysis with an MDL greater than the most stringent drinking water standard that results in non-detection needs to be reanalyzed with the MDL set lower than the drinking water standard or at the lowest level achievable by the laboratory. All quality assurance/quality control (QA/QC) samples must be run on the same dates when samples were actually analyzed. Proper chain of custody procedures must be followed, and a copy of the completed chain of custody form shall be submitted with the report. All analyses must be performed by an Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed below, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge.

### DISCHARGE 001

Produced wastewater samples shall be collected downstream from the treatment system and prior to discharge to land (roads, ponds, etc.) (Discharge 001). Produced wastewater monitoring for Discharge 001 shall include at least the following:

| Constituent/Parameter | Units | Sample Type | Frequency |
|---|---|---|---|
| Flow | mgd | Metered[1] | Continuous |
| Table I – Effluent Monitoring | Varies | Grab | Varies |

[1] In accordance to Order Provision E.3, instead of metering an engineered alternative may be used if approved in writing by the Executive Officer.

### DISCHARGE 002

If ponds are used, produced wastewater samples shall be collected in the pond at the distal end of the system (Discharge 002), or if ponds are operated in parallel, in the pond that has contained produced wastewater for the longest period of time (i.e., longest retention time)(Discharge 002). Produced wastewater monitoring for Discharge 002 shall include at least the following:

| Constituent/Parameter | Units | Sample Type | Frequency |
|---|---|---|---|

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| Constituent/Parameter | Units | Sample Type | Frequency |
|---|---|---|---|
| Table I – Effluent Monitoring | Varies | Grab | Varies |

## SOLID WASTE MONITORING

Solid waste generated at the Facility from production related activities, such as tank or pond maintenance, shall be characterized for disposal. Non-hazardous solid wastes may be disposed on-site, as road or berm construction material, for instance, if such disposal does not pose a threat to water quality.

Hazardous waste (as defined in California Code of Regulations (CCR), title 22, section 66261.1) and designated wastes (as defined in California Water Code (CWC) section 13173) shall be properly disposed at a Facility permitted to accept the waste.

Solid wastes disposed off-site shall be transported to an appropriately permitted facility.

Solid waste volumes, disposal methods, disposal facilities, and analytical results from waste characterization shall be reported in the subsequent quarterly and annual monitoring reports.

## GROUNDWATER WELL SURVEY

The Discharger shall conduct a well survey to identify all water supply wells within one-mile of the ponds that receive produced wastewater or other authorized discharges. The Discharger shall sample the identified domestic water supply wells and analyze the samples for the waste constituents listed in Table II of this MRP. If access to private property is requested and denied, a demonstration of that denial is required.

## GROUNDWATER MONITORING

The Discharger shall operate and maintain a groundwater monitoring system that may include groundwater wells available around and downgradient of the Facility and within a reasonable distance from the produced wastewater disposal ponds. At a minimum the monitoring system needs to include three groundwater wells, with at least two wells located downgradient from the ponds' location that monitor first-encountered groundwater to identify any release at the earliest possible time. **If the Discharger demonstrates that the wastes discharged to the ponds cannot affect the quality of underlying groundwater, the Executive Officer may rescind by signed letter all or part of the requirements to complete the groundwater investigation and groundwater monitoring portions of this Order. A Small Operator is one that discharges less than 250 bbls per day of produced wastewater to land. Small operators may apply for a temporary exclusion from groundwater monitoring if they are in an area that will be considered for a basin plan amendment that removes the designated beneficial uses of groundwater and if they provide relevant technical information demonstrates a high likelihood of amendment success. All exclusions must be approved in writing by the Executive Officer.**

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After measuring water levels and prior to collecting samples, each monitoring well shall be adequately purged to remove water that has been standing within the well screen and casing that may not be chemically representative of formation water. Depending on the hydraulic conductivity of the geologic setting, the volume removed during purging is typically from 3 to 5 volumes of the standing water within the well casing and screen, or additionally the filter pack pore volume.

The Discharger shall monitor groundwater wells for the following:

| Constituent/Parameter | Units | Sample Type | Frequency |
|---|---|---|---|
| Depth to groundwater | Feet[1] | Measured | Quarterly |
| Groundwater elevation | Feet[1] | Calculated | Quarterly |
| Table II – Groundwater Monitoring | Varies | Grab | Quarterly |

[1] Recorded to one hundredth of a foot

**Within 30 days** of notification that permission to locate or sample a well(s) is not granted or is revoked, the Discharger shall submit for review and approval by Central Valley Water staff a report that either: (1) demonstrates that a reduction in the number of monitoring well(s) will not impair the ability to clearly and accurately assess potential groundwater impacts, or (2) proposes the installation of a new monitoring well(s) to offset the well(s) that is no longer able to be sampled.

## Groundwater Monitoring System

If an appropriate groundwater monitoring system is not in place prior to adoption of the Order, the discharger shall comply with the following monitoring well compliance time schedule:

| Task | Task Description | Due Date | |
|---|---|---|---|
| | | Small Operator[1] | Large Operator[2] |
| 1 | Submit a Monitoring Well Installation and Sampling Plan (MWISP) for review and approval by the Executive Officer | 12 Months after NOA is issued | 90 Days after NOA is issued |
| 2 | Complete installation of the groundwater monitoring system | In accordance with approved time schedule in MWISP | |
| 3 | Submit a Monitoring Well Installation Completion Report (MWICR) | 90 Days after groundwater monitoring system is completed | |

[1] A Small Operator discharges 250 or fewer barrels of wastewater per day to land.
[2] A Large Operator discharges more than 250 barrels of wastewater per day to land.

At a minimum, the MWISP must contain all of the information listed below.

1. General Information:
   a. Topographic map showing any existing nearby (about 2,000 feet) domestic, irrigation, and municipal supply wells and monitoring wells known to the Discharger, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features, as appropriate.

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b. Site plan showing proposed well locations, other existing wells, unused and/or abandoned wells, major physical site structures, any waste handling facilities, irrigated cropland and pasture, and on-site surface water features.
c. Rationale for the number of proposed monitoring wells, their locations and depths, and identification of anticipated depth to groundwater.
d. Local permitting information (as required for drilling, well seals, boring/well abandonment).
e. Drilling details, including methods and types of equipment for drilling and logging activities. Equipment decontamination procedures (as appropriate) should be described.
f. Health and Safety Plan.

2. Proposed Drilling Details:
   a. Drilling techniques.
   b. Well logging method.
   c. Proposed Monitoring Well Design - all proposed well construction information must be displayed on a construction diagram or schematic to accurately identify the following:
   d. Well depth.
   e. Borehole depth and diameter.
   f. Well construction materials.
   g. Casing material and diameter – include conductor casing, if appropriate.
   h. Location and length of perforation interval, size of perforations, and rationale.
   i. Location and thickness of filter pack, type and size of filter pack material, and rationale.
   j. Location and thickness of bentonite seal.
   k. Location, thickness, and type of annular seal.
   l. Surface seal depth and material.
   m. Type of well cap(s).
   n. Type of well surface completion.
   o. Well protection devices (such as below-grade water tight-vaults, locking steel monument, bollards, etc.).

3. Proposed Monitoring Well Development:
   a. Schedule for development (not less than 48 hours or more than 10 days after well completion).
   b. Method of development.
   c. Method of determining when development is complete.
   d. Parameters to be monitored during development.
   e. Method for storage and disposal of development water.

4. Proposed Surveying:
   a. How horizontal and vertical position of each monitoring well will be determined.
   b. The accuracy of horizontal and vertical measurements to be obtained.
   c. The California licensed professional (licensed land surveyor or civil engineer) to perform the survey.

5. Proposed Groundwater Monitoring:
   a. Schedule (at least 48 hours after well development).

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b. Depth to groundwater measuring equipment (e.g., electric sounder or chalked tape capable of ±0.01-foot measurements).
c. Well purging method, equipment, and amount of purge water.
d. Sample collection (e.g., bottles and preservation methods), handling procedures, and holding times.
e. Quality assurance/quality control (QA/QC) procedures (as appropriate).
f. Analytical procedures.
g. Equipment decontamination procedures (as appropriate).

6. Proposed Schedule:
   a. Fieldwork.
   b. Laboratory analyses.
   c. Report submittal.

At a minimum, the MWICR shall summarize the field activities as described below.

1. General Information:

   a. Brief overview of field activities including well installation summary (such as number, depths), and description and resolution of difficulties encountered during field program.
   b. Topographic map showing any existing nearby domestic, irrigation, and municipal supply wells and monitoring wells, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features.
   c. Site plan showing monitoring well locations, other existing wells, unused and/or abandoned wells, major physical site structures, any waste handling facilities, and on-site surface water features.
   d. Period of field activities and milestone events (e.g., distinguish between dates of well installation, development, and sampling).

2. Monitoring Well Construction:
   a. Number and depths of monitoring wells installed.
   b. Monitoring well identification (i.e., numbers).
   c. Date(s) of drilling and well installation.
   d. Description of monitoring well locations including field-implemented changes (from proposed locations) due to physical obstacles or safety hazards.
   e. Description of drilling and construction, including equipment, methods, and difficulties encountered (such as hole collapse, lost circulation, need for fishing).
   f. Name of drilling company, driller, and logger (site geologist to be identified).
   g. As-builts for each monitoring well with the following details:
      i. Well identification.
      ii. Total borehole and well depth.
      iii. Date of installation.
      iv. Boring diameter.
      v. Casing material and diameter (include conductor casing, if appropriate).
      vi. Location and thickness of slotted casing, perforation size.
      vii. Location, thickness, type, and size of filter pack.

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viii. Location and thickness of bentonite seal.
ix. Location, thickness, and type of annular seal.
x. Depth of surface seal.
xi. Type of well cap.
xii. Type of surface completion.
xiii. Depth to water (note any rises in water level from initial measurement) and date of measurement.
xiv. Well protection device (such as below-grade water tight vaults, stovepipe, bollards, etc.).

h. All depth to groundwater measurements during field program.
i. Field notes from drilling and installation activities (e.g., all subcontractor dailies, as appropriate).
j. Construction summary table of pertinent information such as date of installation, well depth, casing diameter, screen interval, bentonite seal interval, and well elevation.

3. Monitoring Well Development:
   a. Date(s) and time of development.
   b. Name of developer.
   c. Method of development.
   d. Methods used to identify completion of development.
   e. Development log: volume of water purged and measurements of temperature, pH and electrical conductivity during and after development.
   f. Disposition of development water.
   g. Field notes (such a bailing to dryness, recovery time, number of development cycles).

4. Monitoring Well Survey:
   a. Identify coordinate system or reference points used.
   b. Description of measuring points (i.e. ground surface, top of casing, etc.).
   c. Horizontal and vertical coordinates of well casing with cap removed.
   d. Name, license number, and signature of California licensed professional who conducted survey.
   e. Surveyor's field notes.
   f. Tabulated survey data.

## REPORTING REQUIREMENTS

All monitoring results shall be reported in Quarterly Monitoring Reports which are due by the first day of the second month after the calendar quarter as follows:

| | |
|---|---|
| First Quarter Monitoring Report (January – March): | 1 May |
| Second Quarter Monitoring Report (April – June): | 1 August |
| Third Quarter Monitoring Report (July – September): | 1 November |
| Fourth Quarter Monitoring Report (October – December): | 1 February |
| Facility Inspection Report (Completed by 30 October): | 30 November |

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**A transmittal letter shall accompany each monitoring report**. The transmittal letter shall discuss any violations that occurred during the reporting period and all actions taken or planned for correcting violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions or a time schedule for implementing the corrective actions, reference to the previous correspondence is satisfactory. Reports shall be submitted whether or not there is a discharge.

The following information is to be included on all monitoring reports, as well as report transmittal letters:

Discharger's name
Facility/Lease Name
Waste Discharge Requirements XXXX-XXXX
Monitoring and Reporting Program R5-2017-0XXX
GeoTracker Site Global ID: XXXXXXXXXXXX

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible for all historical and current data. The data shall be summarized in such a manner that illustrates clearly, whether the Discharger complies with waste discharge requirements.
In addition to the details specified in Standard Provision C.3, monitoring information shall include the MDL and the Reporting limit (RL) or PQL. If the regulatory limit for a given constituent is less than the RL (or PQL), then any analytical results for that constituent that are below the RL (or PQL), but above the MDL, shall be reported and flagged as estimated.

If the Discharger monitors any constituent at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the quarterly monitoring reports. Such increased frequency shall be indicated on the quarterly monitoring reports.

All monitoring reports shall comply with the signatory requirements in Standard Provision B.3. All monitoring reports that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1.

The Discharger shall submit electronic copies of all work plans, reports, analytical results, and groundwater elevation data over the Internet to the State Water Board Geographic Environmental Information Management System database (GeoTracker)
at http://www.waterboards.ca.gov/ust/electronic_submittal/index.shtml
A frequently asked question document for GeoTracker can be found
at http://www.waterboards.ca.gov/ust/electronic_submittal/docs/faq.pdf
Electronic submittals shall comply with GeoTracker standards and procedures, as specified on the State Water Board's web site. Uploads to GeoTracker shall be completed on or prior to the due date.

In addition, a hard copy of each document shall be submitted to:

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California Regional Water Quality Control Board
Central Valley Region
1685 E Street, Suite 200
Fresno, CA 93706
Attn: Ronald E. Holcomb

GeoTracker Site Global ID: XXXXXXXXXXXX

A. **All Quarterly Monitoring Reports shall include the following**:

**Facility reporting:**
1. Monthly freeboard results as specified on MRP page 2.
2. The results of Facility inspections conducted during the quarter as specified on MRP page 2.
3. Rainfall data as specified on MRP page 2.

**Chemical and Additive reporting:**
1. The data required as specified on MRP page 2 and 3.

**Produced Wastewater reporting:**
1. Tabular summary of current and historical results of effluent discharges as specified on page 3 and 4.
2. For each month of the quarter, calculation monthly effluent flow and the historical monthly effluent flow for the last 12-months.
3. For each quarter, include a current and historical table for each effluent sample point for EC, boron, chloride, and sodium.

**Solid Waste reporting:**
1. The results of solid Waste monitoring specified on MRP page 4, including the nature, volume, and weight in dry tons of solid waste produced during the quarter.
2. Analytical results characterizing the solid waste, and particularly, whether the waste is hazardous as defined in CCR, title 22, section 66261.1).
3. The method of disposal and disposal locations of the solid wastes.
4. If wastes are hauled to a disposal facility, evidence that the disposal facility is properly permitted.

**Groundwater reporting:**
1. The results of groundwater monitoring specified on page 4 and 5.
2. For each monitoring well, a table showing constituent concentrations for current and historical concentrations.
3. A groundwater contour map based on groundwater elevations for that quarter. The map shall show the gradient and direction of groundwater flow under/around the facility and/or effluent disposal area(s). The map shall also include the locations of monitoring wells and wastewater storage and discharge areas.

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B. **Fourth Quarter Monitoring Reports**, in addition to the above, by 1 February of each year, the Discharger shall submit a written report to the Executive Officer containing the following:

**Production Facility information:**

1. The names and general responsibilities of all persons employed to operate the produced wastewater treatment systems.
2. The names and telephone numbers of persons to contact regarding the Facility for emergency and routine situations.
3. If field meters are used, then a statement certifying when the flow meters and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.4).
4. A summary of all spills/releases, if any, that occurred during the year at the facility, tasks undertaken in response to the spills, and the results of the tasks undertaken.
5. A summary of the chemical and additive data collected under the Chemical and Additive Monitoring section, the required MSDS sheets, chemical formulas and specific chemical names, and a discussion of whether any of the chemicals or additives were found in effluent discharges.
6. A flow chart (i.e. diagram that clearly illustrates all processes that produced wastewater undergoes from well extraction to discharge to land) and map of the following:
   - Facility within the oil field,
   - Facility/Lease boundaries
   - Production and wastewater distribution network with all stock tanks, and transfer pipes, and discharge points to the ponds or land.
7. Annual report in tabular form for all the effluent and groundwater monitoring data and domestic water supply well data, if applicable.
8. Annual assessment of groundwater monitoring program's adequacy to assess compliance with the Order, including whether the data provided are representative of conditions upgradient and downgradient of the Facility.
9. Annual assessment of groundwater monitoring to delineate lateral and vertical extend of impacts on groundwater quality.

**Requesting Administrative Review by the State Water Board.** Any person aggrieved by an action of the Central Valley Water Board that is subject to review as set forth in Water Code section 13320(a), may petition the State Water Board to review the action. Any petition must be made in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050 and following. The State Water Board must receive the petition within thirty (30) days of the date the action was taken, except that if the thirtieth day following the date the action was taken falls on a Saturday, Sunday, or state holiday, then the State Water Board must receive the petition by 5:00 p.m. on the next business day. Copies of the laws and regulations applicable to filing petitions may be found on the internet at http://www.waterboards.ca.gov/public_notices/petitions/water_quality/index.shtml or will be provided upon request.

**Modifications.** Any modification to this Monitoring and Reporting Program shall be in writing and approved by the Assistant Executive Officer, including any extensions. Any written extension request by the Discharger shall include justification for the delay.

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The Discharger shall implement the above monitoring program on the first day of the Executive Officer issuance of the NOA for coverage under the Order.

Ordered by: _____

PAMELA C. CREEDON, Executive Officer

_____

(Date)

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**Table I – Effluent Monitoring**

| Parameters | Units | Monitoring Frequency | US EPA or other Method[9] | Reporting Frequency |
|---|---|---|---|---|
| **Field Parameters** | | | | |
| Temperature | °F[1] | Quarterly | Meter | Quarterly |
| Electrical Conductivity | µmhos/cm[2] | Quarterly | Meter | Quarterly |
| pH | pH units | Quarterly | Meter | Quarterly |
| **Monitoring Parameters** | | | | |
| Total Dissolved Solids (TDS) | mg/L[3] | Quarterly | 160.1 | Quarterly |
| Total Suspended Solids (TSS) | mg/L | Quarterly | 160.2 | Quarterly |
| Electrical Conductivity | µmhos/cm | Quarterly | 2510B | Quarterly |
| Total Organic Carbon (TOC) | mg/L | Quarterly | 415.3 | Quarterly |
| Boron, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| **Standard Minerals** | | | | |
| Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Bicarbonate Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Carbonate Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Hydroxide Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Sulfate, dissolved | mg/L | Quarterly | 300.0 | Quarterly |
| Nitrate-N, dissolved | mg/L | Quarterly | 300.0 | Quarterly |
| Calcium, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| Magnesium, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| Sodium, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| Potassium | mg/L | Quarterly | 6010B | Quarterly |
| Chloride | mg/L | Quarterly | 300.0 | Quarterly |
| **PAHs**[4] | µg/L[5] | Quarterly | 8270 | Quarterly |
| **Total Petroleum Hydrocarbons (TPH)** | µg/L | Quarterly | 418.1 | Quarterly |
| **Volatile Organic Compounds** | | | | |
| Full Scan | µg/L | Quarterly | 8260B | Quarterly |
| **Oil and Grease** | mg/L | Quarterly | 1664A | Quarterly |
| **Stable Isotopes** | | | | |
| Oxygen ($^{18}O$) | pCi/L[6] | Quarterly | 900.0 | Quarterly |
| Deuterium (Hydrogen 2, $^{2}H$, or D) | pCi/L | Quarterly | 900.0 | Quarterly |
| **Radionuclides** | | | | |
| Radium-226 | pCi/L | Quarterly | SM[7] 7500-Ra | Quarterly |
| Radium-228 | pCi/L | Quarterly | SM 7500-Ra | Quarterly |
| Gross Alpha particle (excluding | pCi/L | Quarterly | SM 7110 | Quarterly |

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**Table I – Effluent Monitoring**

| Parameters | Units | Monitoring Frequency | US EPA or other Method[9] | Reporting Frequency |
|---|---|---|---|---|
| radon and uranium) | | | | |
| Uranium | pCi/L | Quarterly | 200.8 | Quarterly |
| **Constituents of Concern** | | | | |
| Lithium | mg/L | Quarterly | 200.7 | Quarterly |
| Strontium | mg/L | Quarterly | 200.7 | Quarterly |
| Iron | mg/L | Quarterly | 200.8 | Quarterly |
| Manganese | mg/L | Quarterly | 200.8 | Quarterly |
| Antimony | mg/L | Quarterly | 200.8 | Quarterly |
| Arsenic | mg/L | Quarterly | 200.8 | Quarterly |
| Barium | mg/L | Quarterly | 200.8 | Quarterly |
| Beryllium | mg/L | Quarterly | 200.8 | Quarterly |
| Cadmium | mg/L | Quarterly | 200.8 | Quarterly |
| Chromium (total) | mg/L | Quarterly | 200.8 | Quarterly |
| Chromium (hexavalent) | mg/L | Quarterly | 7196A | Quarterly |
| Cobalt | mg/L | Quarterly | 200.8 | Quarterly |
| Copper | mg/L | Quarterly | 200.8 | Quarterly |
| Lead | mg/L | Quarterly | 200.8 | Quarterly |
| Mercury | mg/L | Quarterly | 7470A | Quarterly |
| Molybdenum | mg/L | Quarterly | 200.8 | Quarterly |
| Nickel | mg/L | Quarterly | 200.8 | Quarterly |
| Selenium | mg/L | Quarterly | 200.8 | Quarterly |
| Silver | mg/L | Quarterly | 200.8 | Quarterly |
| Thallium | mg/L | Quarterly | 200.8 | Quarterly |
| Vanadium | mg/L | Quarterly | 200.8 | Quarterly |
| Zinc | mg/L | Quarterly | 200.8 | Quarterly |
| **Oil Production and Process Chemicals and Additives[8]** | µg/L | Quarterly | As Appropriate[9] | Quarterly |

[1] Degrees Fahrenheit
[2] Micromhos per centimeter
[3] Milligrams per liter
[4] Polycyclic aromatic hydrocarbons
[5] Micrograms per liter
[6] Picocuries per liter
[7] Standard Methods
[8] The Discharger shall provide analytical results for all chemicals and additives used in the exploration, production, and/or processing of all oil and the treatment of produced wastewater discharged to land (e.g., ponds, roads, etc.) as described under the Chemical and Additive Monitoring section of the MRP for which there are ELAP approved analyses. For those constituents for which there are not ELAP approved analytical methods, the Discharger shall submit a technical report describing how it intends to address this issue.
[9] Appropriate analytical methods may be proposed by the Discharger but are subject to the approval of the Assistant Executive Officer

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**Table II – Groundwater Monitoring**

| Parameters | Units | Monitoring Frequency | US EPA or other Method | Reporting Frequency |
|---|---|---|---|---|
| **Groundwater Elevation** | feet & hundredths, MSL[1] | Quarterly | | Quarterly |
| **Field Parameters** | | | | |
| Temperature | °F[2] | Quarterly | Meter | Quarterly |
| Electrical Conductivity | µmhos/cm[3] | Quarterly | Meter | Quarterly |
| pH | pH units | Quarterly | Meter | Quarterly |
| **Monitoring Parameters** | | | | |
| Total Dissolved Solids (TDS) | mg/L[4] | Quarterly | 160.1 | Quarterly |
| Total Organic Carbon (TOC) | mg/L | Quarterly | 415.3 | Quarterly |
| Electrical Conductivity | µmhos/cm | Quarterly | 2510B | Quarterly |
| Boron, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| **Standard Minerals** | | | | |
| Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Bicarbonate Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Carbonate Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Hydroxide Alkalinity as CaCO3 | mg/L | Quarterly | 310.1 | Quarterly |
| Sulfate, dissolved | mg/L | Quarterly | 300.0 | Quarterly |
| Nitrate-N, dissolved | mg/L | Quarterly | 300.0 | Quarterly |
| Calcium, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| Magnesium, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| Sodium, dissolved | mg/L | Quarterly | 6010B | Quarterly |
| Potassium | mg/L | Quarterly | 6010B | Quarterly |
| Chloride | mg/L | Quarterly | 300.0 | Quarterly |
| **PAHs**[5] | µg/L[6] | Quarterly | 8270 | Quarterly |
| **Total Petroleum Hydrocarbons (TPH)** | µg/L | Quarterly | 418.1 | Quarterly |
| **Volatile Organic Compounds** | | | | |
| Full Scan | µg/L | Quarterly | 8260B | Quarterly |
| **Oil and Grease** | mg/L | Quarterly | 1664A | Quarterly |
| **Stable Isotopes** | | | | |
| Oxygen ($^{18}O$) | pCi/L[7] | Quarterly | 900.0 | Quarterly |
| Deuterium (Hydrogen 2, $^{2}H$, or D) | pCi/L | Quarterly | 900.0 | Quarterly |
| **Radionuclides** | | | | |
| Radium-226 | pCi/L | Quarterly | SM[8] 7500-Ra | Quarterly |

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**Table II – Groundwater Monitoring**

| **Parameters** | **Units** | **Monitoring Frequency** | **US EPA or other Method** | **Reporting Frequency** |
|---|---|---|---|---|
| Radium-228 | pCi/L | Quarterly | SM 7500-Ra | Quarterly |
| Gross Alpha particle (excluding radon and uranium) | pCi/L | Quarterly | SM 7110 | Quarterly |
| **Constituents of Concern** | | | | |
| Lithium | mg/L | Quarterly | 200.7 | Quarterly |
| Strontium | mg/L | Quarterly | 200.7 | Quarterly |
| Iron | mg/L | Quarterly | 200.8 | Quarterly |
| Manganese | mg/L | Quarterly | 200.8 | Quarterly |
| Antimony | mg/L | Quarterly | 200.8 | Quarterly |
| Arsenic | mg/L | Quarterly | 200.8 | Quarterly |
| Barium | mg/L | Quarterly | 200.8 | Quarterly |
| Beryllium | mg/L | Quarterly | 200.8 | Quarterly |
| Cadmium | mg/L | Quarterly | 200.8 | Quarterly |
| Chromium (total) | mg/L | Quarterly | 200.8 | Quarterly |
| Chromium (hexavalent) | mg/L | Quarterly | 7196A | Quarterly |
| Cobalt | mg/L | Quarterly | 200.8 | Quarterly |
| Copper | mg/L | Quarterly | 200.8 | Quarterly |
| Lead | mg/L | Quarterly | 200.8 | Quarterly |
| Mercury | mg/L | Quarterly | 7470A | Quarterly |
| Molybdenum | mg/L | Quarterly | 200.8 | Quarterly |
| Nickel | mg/L | Quarterly | 200.8 | Quarterly |
| Selenium | mg/L | Quarterly | 200.8 | Quarterly |
| Silver | mg/L | Quarterly | 200.8 | Quarterly |
| Thallium | mg/L | Quarterly | 200.8 | Quarterly |
| Vanadium | mg/L | Quarterly | 200.8 | Quarterly |
| Zinc | mg/L | Quarterly | 200.8 | Quarterly |
| **Oil Production and Process Chemicals and Additives**[9] | µg/L | Quarterly | As Appropriate[10] | Quarterly |

[1] Mean Sea Level
[2] Degrees Fahrenheit
[3] Micromhos per centimeter
[4] Milligrams per liter
[5] Polycyclic aromatic hydrocarbons
[6] Micrograms per liter
[7] Picocuries per liter
[8] Standard Methods
[9] The Discharger shall provide analytical results for all chemicals and additives used in the exploration, production, and/or processing of all oil and the treatment of produced wastewater discharged to land (e.g., ponds, roads, etc.) as described under the Chemical and Additive Monitoring section of the MRP for which there are ELAP approved analyses. For those constituents for which there are not ELAP approved analytical methods, the Discharger shall submit a technical report describing how it intends to address this issue.
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